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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/693,700	10/24/2003	Chester Ledlie Sandberg	5659-21000	2263

7590

08/25/2005

DEL CHRISTENSEN
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EXAMINER

JEFFERY, JOHN A

ART UNIT	PAPER NUMBER
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3742

DATE MAILED: 08/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/693,700

Applicant(s)

SANDBERG ET AL.

Examiner

John A. Jeffery

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 466-518 is/are pending in the application.
- 4a) Of the above claim(s) 472 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 466-471 and 473-518 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date various.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Acknowledgement of Elected Species

Applicant's election of Species A(1), B(1), D(1), E(1), and F(1) from Species Groups A, B, and D-F respectively with traverse is acknowledged. Also, the examiner acknowledges applicant's election without traverse of Species C(2). Accordingly, claim 472 is withdrawn¹ from consideration as being directed to nonelected species.

Regarding Species A(1), the traversal is on the ground that species (2)-(4) are subsets of species (1). Remarks, at 2. However, species (1) consists of embodiments with heaters and methods of heating comprising a single ferromagnetic material only (i.e., without any additional material (ferromagnetic or non-ferromagnetic)). Moreover, examining the multiple species of Species Group A imposes a serious burden on the examiner since they each inherently give rise to a separate field of search despite some overlap in the field of search. See MPEP § 803.

Regarding Species B(1), D(1), and F(1), applicant traverses on the ground that none of the currently pending claims reads on the respective species groups. Although the currently pending claims may not read on the listed species, the species are nonetheless disclosed and patentably distinct from each other. Moreover, given the unusually vast number of disclosed patentably distinct species in the instant application, and the possibility that the scope and content of the claims could change during

¹ Although only one currently pending claim is withdrawn from consideration responsive to applicant's election, in view of (1) the unusually vast number of disclosed patentably distinct species in the instant application, and (2) the possibility that the scope and content of the claims could change during

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prosecution which may necessitate a later election of species, imposing an election of disclosed patentably distinct species at this time is proper. Moreover, identification of disclosed patentably distinct species as early as possible during prosecution – particularly when an unusually vast number of species is disclosed (as is the case here) -- ensures compact prosecution on the merits and avoids piecemeal examination that could result from subsequent election of species requirements. See MPEP § 707.07(g) (“Piecemeal examination should be avoided as much as possible.”).

The requirement is still deemed proper and is therefore made FINAL.

Regarding Species Group E, the examiner has withdrawn the species election requirement for this group upon further reconsideration.

Claim Rejections - 35 U.S.C. § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 466-469, 474, 475, 478-480, 483-486, 489-492, 495, 496, and 500-502 are rejected under 35 USC 102(b) as being anticipated by EP130671. EP130671 discloses a fluid electric heater (P. 17 and Fig. 4) comprising ferromagnetic materials configured such that the heater automatically reduces its heat output near or above a

prosecution which may necessitate a later election of species, imposing an election of disclosed patentably distinct species at this time is proper.

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selected temperature (Curie temperature of the ferromagnetic material). The heater autoregulates its temperature about the Curie temperature via its intrinsic resistance. See abstract and P. 13, lines 3-14. The heater is connected to an AC source with a frequency of 50 Hz – 10 KHz. See P. 8, line 19-23.

Regarding claim 474, EP130671 discloses a number of different iron-nickel alloys with varying Curie temperatures suitable as ferromagnetic materials for autoregulating electric heaters. See P. 14, Table I (noting that iron-nickel alloys have relatively lower Curie temperatures compared to other ferromagnetic materials).

Regarding claims 466 and 485, the limitation that the selected temperature is “within about 50 °C of the Curie temperature of the ferromagnetic material” fully reads on EP130671 since the selected temperature disclosed in EP130671 (i.e., the Curie temperature) falls within the claimed range.

Regarding claims 467-469, the claimed power source frequencies are fully met by EP130671 who discloses connecting the heater to an AC source with a frequency of 50 Hz – 10 KHz. See P. 8, line 19-23.

Regarding claims 475 and 496, see P. 9, lines 24-26.

Regarding claim 478, see P. 6, lines 24-28.

Regarding claim 500, because (1) the heater of EP130671 utilizes the skin effect of the conductor to ultimately dictate its heating, (2) the inverse relationship between frequency and skin depth is well known (see P. 2, lines 11-28), and (3) a wide frequency range of 50 Hz – 10 KHz is envisioned (see P. 8, line 19-23), the heater of EP130671

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would inherently control the skin depth in the conductor by varying the applied frequency.

Joint Inventors -- Common Ownership Presumed

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103, the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligations under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103.

Claim Rejections - 35 U.S.C. § 103(a)

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Claims 470, 473, 476, 477, 481, 482, 487, 488, 493, 494, 497, 499, 503-508, and 510-518 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP130671 in

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view of Pritchett (US 3,757,860). The claims differ from EP130671 in calling for configuring the heater to heat a subsurface formation. But heating subsurface formations with ferromagnetic electric heaters that utilize skin effect heating are well known in the art. Pritchett (US 3,757,860), for example, discloses a well heater comprising an AC generator 15 connected to ferromagnetic (steel) casings or pipes 11 and 4 to heat the casings as well as the surrounding subsurface formation by the intrinsic skin effect as electric current flows through the pipes' ferromagnetic material. Thus, the viscosity of liquid produced in the well (i.e., hydrocarbons) is reduced. See abstract, col. 3, lines 19-40, col. 5, line 63 – col. 6, line 61, and the figure. With such a ferromagnetic skin effect heater, the formation can be heated directly by merely connecting AC to a long metallic structure that is buried within the formation, such as a ferromagnetic pipe or casing. In view of Pritchett (US 3,757,860), it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the autoregulating ferromagnetic electric heater to heat subsurface hydrocarbon-producing formations to reduce the hydrocarbons' viscosity thereby enhancing recovery. Such an arrangement enables heating the formation by merely connecting AC to a long metallic structure that is buried within the formation, such as a ferromagnetic pipe or casing.

Regarding claim 473, although current is applied to ferromagnetic well casings 11 and 4, the well casing itself is positioned in an opening comprising an uncased wellbore.

Regarding claim 488, although EP130671 does not expressly state that the initial heat output is at least 50 °C below the Curie temperature, EP130671 nonetheless

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implies initially applying AC to an unheated conductor in P. 13, lines 3-8. This initial unheated state of the electric conductor (and subsequent heating to the Curie temperature) would reasonably suggest to the skilled artisan that the heater's initial heat output is at least 50 °C below the Curie temperature.

Regarding claims 481, 503, and 516, although EP130671 discloses a 50-amp power source (P. 6, line 28), no criticality is seen in using at least 70 amps in lieu of 50 amps. As is well known in the art, increasing the electric current applied to an electric heater will increase the overall heat output. Thus, the specific current would be an engineering design choice well within the level of skilled artisans depending on the heat intensity desired. Moreover, Pritchett (US 3,757,860) teaches that AC is supplied to a skin effect heater at 250 amps. See col. 8, line 62 and col. 6, lines 45-48. In view of Pritchett (US 3,757,860), it would have been obvious to one of ordinary skill in the art at the time of the invention to provide a higher current power source to increase the electric heater's overall heat output.

Regarding claims 476, 477, 482, 494, 499, 504, 514, and 517, no criticality is seen in the specific values of reduced heat above or near the selected temperature, turndown ratio, the conductor's resistance as a function of temperature, and heat output reduction in lieu of the autoregulating heater disclosed in the prior art. Moreover, the specific values claimed merely optimize result-effective variables well within the scope of routine experimentation by skilled artisans depending on the desired temperature and

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heat output.² It is well settled that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233,235 (CCPA 1955).

Claims 471 and 498 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP130671 in view of Vanegmond et al. (US 4,572,299). The claims differ from the previously cited prior art in calling for heating the hydrocarbon material at or above a pyrolysis temperature. But heating subsurface hydrocarbon formations at or above pyrolysis temperatures is well known in the art as evidenced, for example, by Vanegmond et al. (US 4,572,299) in col. 1, line 39 – col. 2, line 7. As is well known in the art, heating formations at or above pyrolyzing temperatures to enable recovery of hydrocarbons from the formation. In view of Vanegmond et al. (US 4,572,299), it would have been obvious to one of ordinary skill in the art at the time of the invention to heat the formation at or above pyrolyzing temperatures to enable recovery of hydrocarbons from the formation.

Claim 509 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP130671 in view of Pritchett (US 3,757,860) and further in view of Vanegmond et al. (US 4,572,299). The claims differ from the previously cited prior art in calling for heating the hydrocarbon material at or above a pyrolysis temperature. But heating subsurface hydrocarbon formations at or above pyrolysis temperatures is well known in the art as

² Further evidence of such engineering design considerations can be found in *Recommended Practice for*

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evidenced, for example, by Vanegmond et al. (US 4,572,299) in col. 1, line 39 – col. 2, line 7. As is well known in the art, heating formations at or above pyrolyzing temperatures to enable recovery of hydrocarbons from the formation. In view of Vanegmond et al. (US 4,572,299), it would have been obvious to one of ordinary skill in the art at the time of the invention to heat the formation at or above pyrolyzing temperatures to enable recovery of hydrocarbons from the formation.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 466-471 and 473-518 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 268-408, 625, 659, 685, and 710 of copending Application No. 10/693,816 in view of EP130671. The claims differ from the claims of the '700 application in calling for a AC power source with a frequency of 100 Hz – 1000 Hz. Powering ferromagnetic electric heaters with AC sources with such frequencies, however, is well known in the art. EP130671, for example, discloses a fluid electric heater (P. 17 and Fig. 4) comprising ferromagnetic materials configured such that the heater automatically reduces its heat output near or above a selected temperature (Curie temperature of the ferromagnetic material) such that it autoregulates its temperature about the Curie temperature via its intrinsic resistance. See abstract and P. 13, lines 3-14. The heater is connected to an AC source with a frequency of 50 Hz – 10 KHz. See P. 8, line 19-23. Such a wide frequency range enables the skin depth (and heating) to be precisely controlled in view of the well-known inverse relationship between frequency and skin depth. See P. 2, lines 11-28. In view of EP130671, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide an AC power source in the claimed frequency range in the apparatus claimed in the '816 application to precisely control the skin depth (and heating) by selecting an associated higher frequency.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Other Pertinent Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Applicant should (1) separately consider the art, and (2) consider the art together with the previously cited prior art for potential applicability under 35 U.S.C. §§ 102 or 103 when responding to this action. The article by McGee, US 792, US 945, US 906, US 837, GB 405, US 037, US 1587, US 4587, EP 927, and CA 987 all disclose ferromagnetic heaters relevant to the instant invention.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John A. Jeffery whose telephone number is (571) 272-4781. The examiner can normally be reached on Monday - Thursday from 7:00 AM to 4:30 PM. The examiner can also be reached on alternate Fridays.

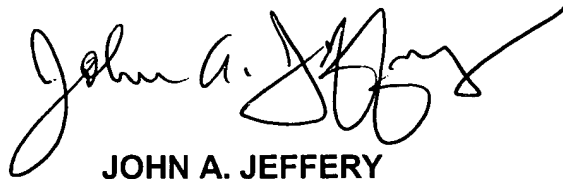
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robin Evans, can be reached on (571) 272-4777. All faxes should be sent to the centralized fax number at (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

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Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "John A. Jeffery", with a stylized flourish extending from the end.

**JOHN A. JEFFERY
PRIMARY EXAMINER**

8/22/05